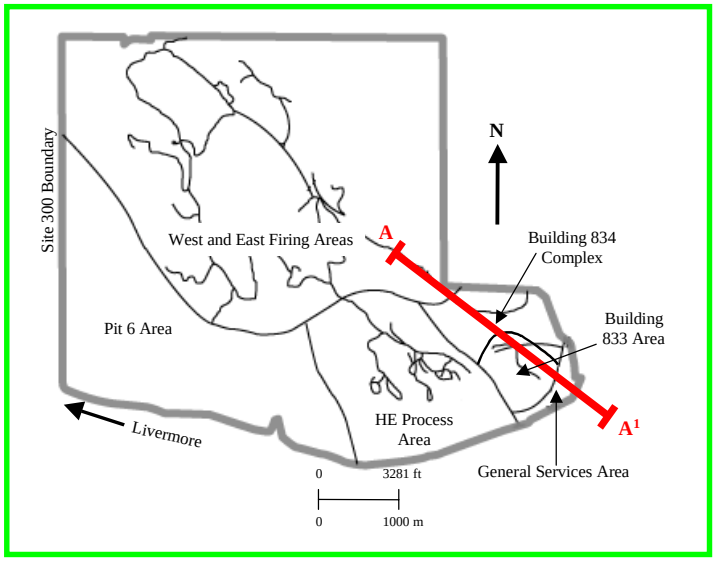
# Vadose Zone Fact Sheet
## Lawrence Livermore National Laboratory Site 300

**Background:** Lawrence Livermore National Laboratory (LLNL) Site 300 is located 105 km (65 mi) east of San Francisco, California, and 13 km (8 mi) southwest of the City of Tracy. Site 300 is a remote experimental test facility that occupies 29 $km^2$ (11 $mi^2$) of rugged foothills that straddle Alameda and San Joaquin Counties.

**Issues:** Even though Site 300 is located in a remote area, the City of Tracy is in the process of zoning areas adjacent to Site 300 for residential development.

**Vadose zone infiltration:** Rainfall amounts are low and evaporation and transpiration rates are high, so relatively small amounts of precipitation recharge the aquifers except where the ground water is near the surface. Potential evapotranspiration is 152 cm (60 in) per year.

**Vadose zone characterization/remediation:** Assessment is 80 percent complete. Low concentrations of volatile organic compounds (VOCs) and high explosives are present in the soil. Soil remediation is being conducted to prevent further releases of VOCs to the ground water. Soil vapor extraction is under way at the central General Service Area and will be undertaken at Building 834.



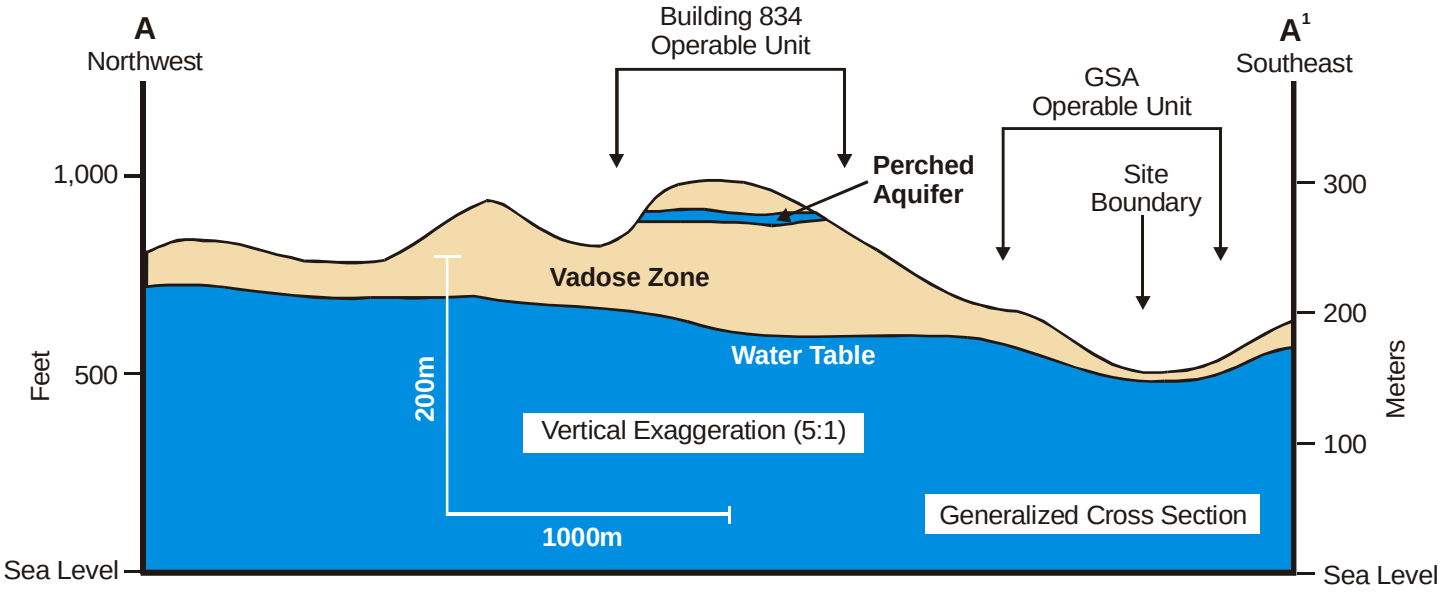

**Precipitation:** The climate is semi-arid with an annual average precipitation of 25 cm (10 in).

**Surface waters:** There are 20 springs at Site 300, but no permanent surface waters.

**Geology:** The topography is very rugged, with up to 366 m (1,200 ft) of relief. The bedrock is composed of layers of siltstone, claystone, and sandstone of various permeabilities. Several regional faults transect Site 300, as does a broad northwest-southeast trending anticline. Strata north of the anticline generally dip to the northeast while strata to the south of the anticline dips to the southeast.

**Vadose zone thickness:** The vadose zone ranges in thickness from zero at the springs where the ground water daylights, to a few meters above the alluvial aquifer, to hundreds of meters at the topographically high areas.

**Major contaminants of concern:** Volatile organic carbons (VOCs, primarily trichloroethylene [TCE]), tritium, uranium 238, and high-explosive compounds.




September 2000

# Ground Water Fact Sheet
## Lawrence Livermore National Laboratory Site 300

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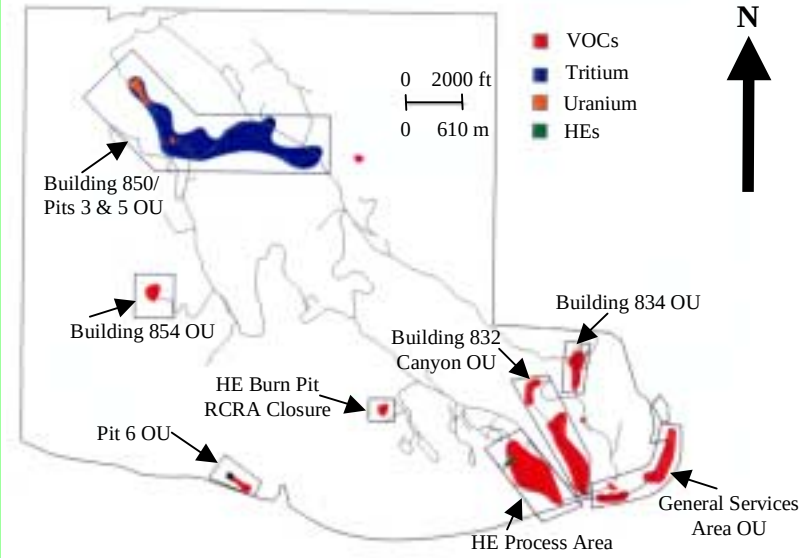
**Hydrogeology:** Many distinct water bearing zones have been identified at Site 300. Faults, folds, and permeability contrasts influence ground water flow. Ground water flow is often dip controlled. A regional aquifer underlies the area, but there are also perched aquifers and shallow alluvial aquifers.

**Issues:** Contaminated ground water has migrated off-site at the General Services Area (GSA), threatening two water supply wells. LLNL has made a formal agreement to provide clean water wells or local surface water supplies if these wells become contaminated. The off-site migration has been hydraulically controlled.



Location of Ground Water Contamination

**Ground water characterization/remediation:** The major ground water plumes at Site 300 have been delineated. At present, the levels of contamination in the ground water do not pose immediate health risks to site workers or the public. The use of pump and treat technology for contaminated ground water has been ongoing since 1991. Light and dense non-aqueous phase liquids (LNAPLs and DNAPLs) are present in a perched aquifer at Building 834. DNAPLs may also be present in the General Services Area.

**Ground water use:** Ground water provides the properties surrounding Site 300 with potable water and stock water.

| Plume Designation | Primary Contaminants | Depth | Remedial Approach |
|---|---|---|---|
| GSA | TCE | 3 to 6 m (10-20 ft) | P&T |
| B834 | TCE | 6 to 21 m (20-70 ft) | P&T |
| Pit 6 Landfill | TCE; tritium | 8 to 23 m (25-75 ft) | Cap; MNA |
| HEPA | TCE; HE compounds; nitrate; perchlorate | 6 to 15 m (20-50 ft) | Cap, P&T |
| Pits 3&5 | TCE; tritium | 5 to 61 m (15-200 ft) | To be determined |
| B850 | Tritium; U-238 | 5 to 15 m (15-50 ft) | Soil removal; MNA |
| B854 | TCE | 0 to 55 m (180 ft) | P&T |
| B832 Canyon | TCE; nitrate | 2 to 61 m (6-200 ft) | P&T |
| B801 | TCE | 37 m (120 ft) | Monitor |
| B833 | TCE | 5 to 12 m (18-38 ft) | Monitor |
| B851 | U-238;TCE | 50 m (165 ft) | Monitor |

TCE = trichloroethylene; HE = high explosives; U = uranium; P&T = pump and treat; MNA = monitored natural attenuation